GTE-ERS
TECHNICAL LIBRARY
03364

ESC-0908-92-01

LORAIN LS2000

RELIANCE COMM/TEC

LORAIN SERVICE MODEL LS 2000

RINGING GENERATOR LOAD TEST SET

LORAIN SERVICE

MODEL LS2000

RINGING GENERATOR

LOAD TEST SET

TABLE OF CONTENTS

Par.	Title	Page
1.0	Introduction	4
2.0	Ratings	5
2.1	Load Capabilities	5
2.2	Metering	6
2.3	Frequency Counter	7
2.4	Power Requirements	8
2.5	Test Leads	9
3.0	Operation	11
3.1	Voltage Measurements	11
3.2	Load Testing	8, 12, 13
3.3	Current Limiting Adjustments	14
3.4	Frequency Measurements	15
3.5	Office Load Measurements	16
4.0	Maintenance	17, 18

Schematic Diagram SD-LS2000

1.0 INTRODUCTION

The Lorain Service Model LS2000, Ringing Generator Load Test Set, provides all of the necessary instrumentation to properly adjust and maintain ringing generators in a telephone central .office. Ringing voltages can be accurately measured with the built in iron vane AC voltmeter. Full load and current limiting capabilities can be verified on ringing generators rated as high as 100 watts. A digital frequency counter is provided to achieve an accurate measurement of each generator's frequency.

2.0 RATINGS

2.1 LOAD CAPABILITIES

2.1.1 Coarse load steps of 12.5W, 25W, 50W and 75W and a fine adjustment step of 4W to 17W.

2.1.2 140VAC maximum for continuous loading, 150VAC maximum for intermittent.

2.1.3 Load switch will open entire load bank for testing.

2.1.4 Jacks are provided for external loading which will appear on test set ammeters.

2.2 METERING

2.2.1 Voltmeter: 0-250VAC, 3½" iron vane type, accuracy ±2%.

2.2.2 Ammeters selectable by a switch: (1) 0-500MA, 2½" iron vane type, accuracy ±2%; (1) 0-2 Amp, 2½" iron vane type, accuracy ±2%.

2.3 FREQUENCY COUNTER

2.3.1 Ranges: 0 to 99.9 Hz. or 0 to 999 Hz. selectable by a panel mounted switch.

2.3.2 Crystal controlled; accuracy:

99.9 Hz. range ±0.1 Hz.

999 Hz range ±1.0 Hz.

2.3.3 Display: 0.375 inch LED's

2.3.4 Input sensitivity: 20 volts

2.3.5 Input impedance 1 to 1000 Hz. 100,000 ohms

2.3.6 Power Supply Voltage: 12VDC from internal battery pack.

2.4 POWER REQUIREMENTS

2.4.1 Internal rechargeable battery provides up to 8 Hrs. of continuous use of the frequency counter.

2.4.2 Low voltage "recharge battery" alarm indicates a discharged battery and time to recharge.

2.4.3 Charger is activated when the removable AC line cord is plugged in and provides a current limited and regulated recharge voltage. Recharge time: 10-16 Hrs.

2.4.4 Max. input current at 120VAC: Less than 1 amp.

2.4.5 Charger and frequency counter can be operated simultaneously.

2.5 TEST LEADS

2.5.1 Test leads provided: (1) 10' 20 ga red and black leads terminated with pin jacks; (1) 10' 20 ga red and black leads terminated with alligator clips. Both lead sets are terminated with male banana jacks.

2.5.2 Input plug of test set is female banana type.

FIGURE 2

Output Voltage	15W Generator			25W Generator			50W Generator			100W Generator		
	50% Load	100% Load	130% Load	50% Load	100% Load	130% Load	50% Load	100% Load	130% Load	50% Load	100% Load	130% Load
85	.089A	.177A	.230A	.148A	.295A	.383A	.295A	.589A	.765A	.589A	1.177A	1.530A
90	.084A	.167A	.217A	.139A	.278A	.361A	.278A	.556A	.722A	.556A	1.111A	1.444A
95	.079A	.158A	.206A	.132A	.263A	.342A	.263A	.526A	.684A	.526A	1.053A	1.368A
100	.075A	.150A	.195A	.125A	.250A	.325A	.250A	.500A	.650A	.500A	1.000A	1.300A
105	.072A	.143A	.186A	.119A	.238A	.310A	.238A	.476A	.619A	.476A	.952A	1.238A
110	.069A	.136A	.177A	.114A	.227A	.295A	.227A	.455A	.591A	.455A	.909A	1.182A
115	.066A	.130A	.170A	.109A	.217A	.283A	.217A	.435A	.565A	.435A	.870A	1.130A
120	.063A	.125A	.163A	.105A	.208A	.271A	.208A	.417A	.542A	.417A	.833A	1.083A
125	.060A	.120A	.156A	.100A	.200A	.260A	.200A	.400A	.520A	.400A	.800A	1.040A
130	.058A	.115A	.150A	.097A	.192A	.250A	.192A	.385A	.500A	.385A	.769A	1.000A
135	.056A	.111A	.145A	.093A	.185A	.241A	.185A	.370A	.481A	.370A	.741A	.963A
140	.054A	.107A	.140A	.090A	.179A	.232A	.179A	.357A	.464A	.357A	.714A	.929A
145	.052A	.103A	.135A	.087A	.172A	.224A	.172A	.345A	.448A	.345A	.690A	.897A
150	.050A	.103A	.130A	.084A	.167A	.217A	.167A	.333A	.433A	.333A	.667A	.867A

3.0 OPERATION

3.1 VOLTAGE MEASUREMENTS

3.1.1 To measure the output voltage of a ringing generator, connect the appropriate set of test leads to the input jacks labeled "ringing input".

CAUTION: RINGING VOLTAGE CAN CAUSE AN ELECTRICAL SHOCK. EXERCISE EXTREME CAUTION WHEN CONNECTING AND DISCONNECTING TEST LEADS.

3.1.2 Verify that all load switches are in the OFF position.

3.1.3 Connect the other end of the test leads to the test jacks or output terminals of the generator to be tested. The neon lamp will light indicating that ringing voltage is present, and the voltmeter will deflect to the true RMS voltage.

3.2 LOAD TESTING

3.2.1 Verify that the generator being tested is off line and not supplying the C.O. load.

3.2.2 Determine the load current for the output voltage present. Refer to Figure 1 or calculate the current using Ohms Law:

$$I = \frac{P}{E}$$

For Example: Output Voltage = 100
Power Rating = 25

$$I \text{ (Current)} = \frac{25W}{100VAC} = .25A \text{ or } 250MA$$

3.2.3 Verify that the fine load adjustment knob is fully CCW. Set ammeter selection switch to 0-.5A position. Turn on the 4W to 17W switch and the 12.5W switch. Slowly adjust the fine load adjustment knob until the current indicated on the ammeter is 0.25A or 250ma. If the output voltage has dropped, the full load current will have to be calculated again to determine the new full load current value.

As progressing load switches are turned on, the load current will double the value provided from the preceding switch. Start with the adjustable load knob fully CCW. Turn on the 4-17W switch and the 12W switch. The adjustable load knob should then be turned CW until the desired load current is reached. If the value desired is not reached when the knob is fully CW, additional load switch(es) will have to be added. First turn the knob fully CCW. Turn off the 12.5 switch and turn on the 25W switch. The knob can now be adjusted CW for a higher current. The following switch

combinations would provide a linear progression in load current: [12.5W], [25W], [12.5W + 25W], [50W], [50W + 12.5W], [75W], [75W + 12.5W], [75W + 25W], [75W + 12.5W + 25W], [75W + 50W], [75W + 12.5W + 50W], [75W + 25W + 50W], [75W + 12.5W + 25W + 50W].

3.2.4 Regulation can be easily checked at this point by turning the main load switch to its off position which will disconnect the entire load. The no load and full load voltages can then be compared to determine regulation characteristics.

3.3 CURRENT LIMITING ADJUSTMENTS

3.3.1 Determine the current limiting value of the ringing generator being tested by referring to the manufacturer's instruction book. Current limiting values at 130% of full load are provided in Figure 1.

3.3.2 To check the present current limiting value, increase the load until the voltage and current stop increasing.

3.3.3 If this value is too high, reset the load until the desired value is reached. Adjust the current limiting control on the ringing generator until the load current meter shows a decrease.

3.3.4 If the current limiting value is too low, adjust the current limiting control of the ringing generator to the maximum setting. Then adjust the load on the ringing generator to the current limiting value desired. The current limiting adjustment on the ringing generator should then be lowered until the ringing voltage starts to decrease.

3.4 FREQUENCY MEASUREMENTS

3.4.1 The frequency counter in the LS2000 is designed with the latest C-MOS technology. A crystal controlled oscillator is used to provide an accurate and stable time base.

3.4.2 To measure the ringing frequency of the generator being tested, simply turn on the frequency ON/OFF switch. The input to the frequency counter is derived from the same input terminals of the LS2000 that are connected to the ringing generator for voltage and load measurements.

3.4.3 Select the range switch for 99.9 Hz or 999 Hz. When measuring ringing generator frequencies, 99.9 Hz position will provide 0.1 Hz. accuracy.

3.4.4 The battery pack inside the LS2000 will provide approximately 8 hours of continuous frequency counter operation. When the "recharge battery" light lights, plug in the AC cord to 120VAC outlet.

3.5 OFFICE LOAD MEASUREMENTS

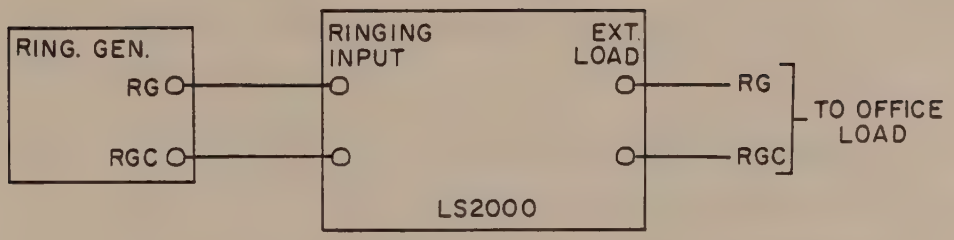


Figure 2

3.5.1 The LS2000 can be used to measure actual office ringing loads.

3.5.2 Verify that all load switches on the LS2000 are in the OFF position.

3.5.3 Referring to Figure 2, connect the input of the LS2000 to the ringing generator main and common output terminals. Connect the office load leads to the jacks on the LS2000 labeled external load.

3.5.4 Select as required the 0 to .5A meter or 0-2 amp meter to read the office load.

4.0 MAINTENANCE AND ADJUSTMENTS

4.1.0 The LS2000 is equipped with 2 fuses for circuit protection.

4.1.1 The AC input to the battery charger is fused with a 1 amp AGC fuse which is mounted in the upper right hand corner of the test set.

4.1.2 The DC input to the frequency counter is fused with a ¼ amp AGC fuse. This fuse is mounted on the back side (trace side) of the frequency counter printed circuit board. To gain access to this fuse, the main panel of the LS2000 must be removed from the case. Loosen the (3) 10-32 screws as shown in Figure 3.

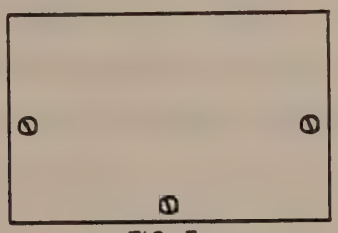


FIG. 3

The panel can then be removed from the case.

4.2 BATTERY CHARGER ADJUSTMENTS

4.2.1 The battery charger is preset to charge the battery at 14.5VDC. If readjustment becomes necessary, follow the procedure below.

1. Remove panel from case.
2. Locate the frequency counter printed circuit board.
3. Remove and insulate the lead connected to terminal 7.
4. Attach a 1000 ohm ½W resistor from terminal 6 to terminal 7.
5. Connect an accurate voltmeter across this resistor.
6. Plug in the AC cord and adjust R26 until the voltage on the meter is 14.5VDC. **CAUTION: WHEN THE AC CORD IS PLUGGED IN, 120VAC APPEARS ON THE BACK OF THE AC INPUT PLUG AND THE AC INPUT FUSE. DO NOT COME IN CONTACT WITH THESE TERMINALS WHILE MAKING ADJUSTMENTS.**
7. Disconnect the resistor and reconnect the lead to terminal 7.

4.2.2 The battery charger is current limited and has no adjustments for current limiting.

COMPONENT LIST

ASSEMBLY

DESIG	CODE	DESCRIPTION
A1	(SVC 1008)	FREQUENCY COUNTER

BATTERY

DESIG	CODE
(2) B1, B2	2 (SVC 1006) 6 VOLT BATTERY

FUSE

DESIG	CODE
F1	(2483-215) 1A AGC

JACK

DESIG	CODE
J1	(SVC 1012)

LAMP

DESIG	CODE
DS1	(2584-505)

METER

DESIG	CODE
M1	(2955-416) 0-250V AC VOLTMETER
M2	(2933-251) 0-.5A AMMETER
M3	(2933-253) 0-2A AMMETER

PLUG

DESIG	CODE
(2) P1, 3	(2471-444)
(2) P2, 4	(2471-445)

RESISTOR

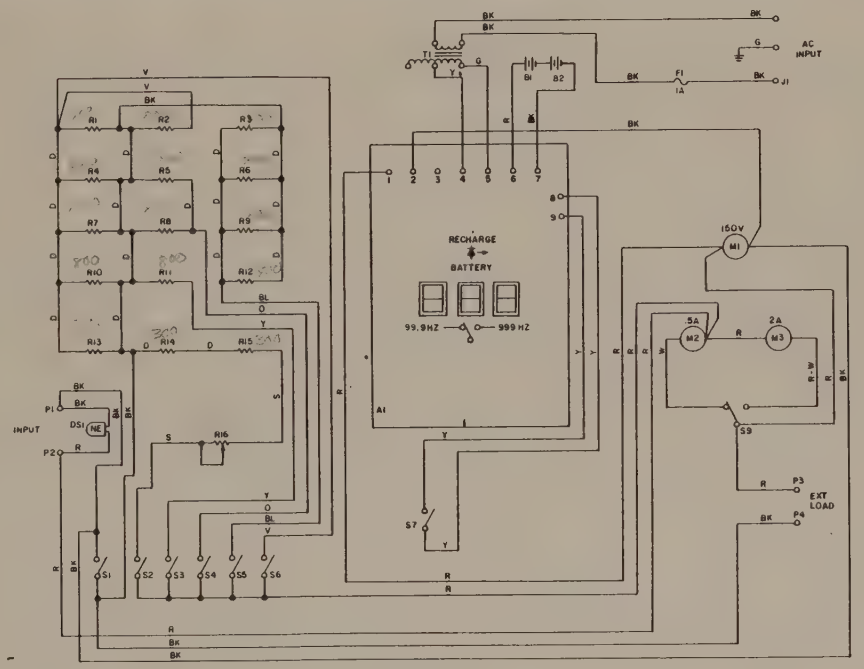
DESIG	CODE
(13) R1-13	(SVC 1017) 800 OHM, 25W
(2) R14, 15	(SVC 1018) 300 OHM, 25W
R16	(SVC 1016) 2000 OHM, 100W

SWITCH

DESIG	CODE
(7) S1-7	(2513-128) SPST SWITCH
S9	(2513-174) SPDT SWITCH

TRANSFORMER

DESIG	CODE
T1	(SVC-1010)



NOTES
1 ALL WIRING TO BE 20 GA

REVISIONS

NO	DESCRIPTION	DATE
1	NEW	

181 4502	
RING LOAD TEST SET MODEL LS2000	
LORAIN SERVICE A RELIANCE ELECTRIC CO LORAIN OHIO	

DESIGN J FRIESS
DRAWN BY J REESE DATE 6-26-78
CHECKED BY DATE
CHECKED BY DATE
APPROVED BY DATE
RATING
TEST SET
WD-LS2000
DWG SIZE D
SHEET 1 OF 1

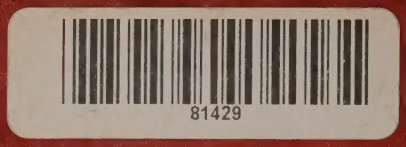
PRINTED IN U.S.A.

ACCOPRESS®

25970	YELLOW
25971	BLACK
25972	LIGHT BLUE
25973	DARK BLUE
25974	LIGHT GRAY
25975	LIGHT GREEN
25976	DARK GREEN
25977	TANGERINE
25978	RED
25979	EXECUTIVE RED

GENUINE PRESSBOARD

ACCO USA, INC.
770 S. ACCO PLAZA
WHEELING, IL 60090


81429